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DEPARTMENT OF TRANSPORTATION (DOT)

Federal Aviation Administration

14 CFR Part 39

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[Docket No. FAA-2004-19144; Directorate Identifier 2003-NE-18-AD]

RIN 2120-AA64

Airworthiness Directives; General Electric Company (GE) CF6-80C2 and CF6-80E1 Turbofan Engines.

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to adopt a new airworthiness directive (AD) for certain GE CF6-80C2 and CF6-80E1 turbofan engines. This proposed AD would require you to:

- Inspect the high pressure compressor rotor (HPCR) stage 11-14 spool shaft for circumferential repair cuts, and
- Repair or replace the spool shaft if you find certain circumferential cuts.

This proposed AD results from an updated stress analysis. We are proposing this AD to prevent failure of the HPCR stage 11-14 spool shaft due to low-cycle fatigue that could result in an uncontained engine failure.

DATES: We must receive any comments on this proposed AD by [insert date 60 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: Use one of the following addresses to send comments on this proposed AD.

- DOT Docket web site: Go to http://dms.dot.gov and follow the instructions for sending your comments electronically.
- Government-wide rulemaking web site: Go to http://www.regulations.gov and follow the instructions for sending your comments electronically.
- Mail: Docket Management Facility; US Department of Transportation, 400 Seventh Street, S.W., Nassif Building, Room PL-401, Washington, DC 20590-001.
- Fax: (202) 493-2251.
- Hand Delivery: Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, S.W., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

You can get the service information identified in this proposed AD from General Electric Company via Lockheed Martin Technology Services, 10525 Chester Road, Suite C, Cincinnati, Ohio 45215, telephone (513) 672-8400, fax (513) 672-8422.

You may examine the comments on this proposed AD in the AD docket on the Internet at http://dms.dot.gov.

FOR FURTHER INFORMATION CONTACT: Karen Curtis, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; telephone (781) 238-7192; fax (781) 238-7199.

SUPPLEMENTARY INFORMATION:

We invite you to submit any written relevant data, views, or arguments regarding this proposal. Send your comments to an address listed under ADDRESSES. Include "Docket No. FAA-2004-19144; Directorate Identifier 2003-NE-18-AD" in the subject

line of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of the proposed AD. We will consider all comments received by the closing date and may amend the proposed AD in light of those comments.

We will post all comments we receive, without change, to http://dms.dot.gov, including any personal information you provide. We will also post a report summarizing each substantive verbal contact with FAA personnel concerning this proposed AD. Using the search function of the DMS web site, anyone can find and read the comments in any of our dockets, including the name of the individual who sent the comment (or signed the comment on behalf of an association, business, labor union, etc.). You may review the DOT's complete Privacy Act Statement in the Federal Register published on April 11, 2000 (65 FR 19477-78) or you may visit http://dms.dot.gov.

We are reviewing the writing style we currently use in regulatory documents. We are interested in your comments on whether the style of this document is clear, and your suggestions to improve the clarity of our communications that affect you. You can get more information about plain language at http://www.faa.gov/language and http://www.plainlanguage.gov.

Examining the AD Docket

You may examine the docket that contains the proposal, any comments received and, any final disposition in person at the DMS Docket Offices between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. The Docket Office (telephone (800) 647-5227) is located on the plaza level of the Department of

Transportation Nassif Building at the street address stated in ADDRESSES. Comments will be available in the AD docket shortly after the DMS receives them.

Discussion

In 1996, GE developed a circumferential cut repair to remove damaged material from seal wire grooves in the outer rim of HPCR stage 11-14 spool shafts installed in certain CF6-80C2 and CF6-80E1 turbofan engines. The damage was due to wear of the seal wire from engine operation. At that time, analysis showed that there was no impact on spool shaft life from the repair geometry. GE performed updated stress analyses in 1999 and 2003. Those stress analyses showed that the circumferential cut geometry resulted in a high-stress concentration. This high-stress concentration could result in a service life that is lower than the published service life of the spool shaft, depending on the spool shaft part number (P/N) and location of the repair. GE reports that as many as 135 CF6-80C2 and CF6-80E1 HPCR 11-14 spool shafts have had this repair. This condition, if not corrected, could result in failure of the HPCR stage 11-14 spool shaft due to low-cycle fatigue that could result in an uncontained engine failure.

Relevant Service Information

We have reviewed and approved the technical contents of GE Aircraft Engines (GEAE) Service Bulletins (SBs) CF6-80C2 S/B 72-1052, Revision 01, dated February 5, 2004; and CF6-80E1 S/B 72-0232, Revision 01, dated February 5, 2004, that describe procedures for inspection and repair of the circumferential cuts in the seal wire grooves of the HPCR stage 11-14 spool shaft.

Differences Between the Proposed AD and the Manufacturer's Service Information

This proposed AD does not require the operator to take further action when a circumferential cut repair is on the forward seal wire groove of the stage 14 disk of a CF6-80E1 or CF6-80C2 Group 2 spool shaft. GEAE, however, recommends repairing these disks at the next exposure, regardless of the number of cycles-since-repair.

FAA's Determination and Requirements of the Proposed AD

We have evaluated all pertinent information and identified an unsafe condition that is likely to exist or develop on other products of this same type design. We are proposing this AD, which would require:

- Inspection of the spool shaft for circumferential repair cuts at the next piece-part level exposure, but not to exceed a specific service cap specified in this proposed AD, and
- Repair or replacement of certain spool shafts.

You must use the service information described previously to perform these proposed actions.

Costs of Compliance

There are approximately 135 GE CF6-80C2 and CF6-80E1 turbofan engines of the affected design in the worldwide fleet. We estimate that 27 engines installed on airplanes of U.S. registry would be affected by this proposed AD. We also estimate that it would take about 1 work hours per engine to inspect for the location of previous circumferential cut repairs and 5 work hours per engine to repair the spool shaft. We estimate that 24 engines would be repaired and that three spool shafts would be replaced. The average labor rate is $65 per work hour. Each replacement spool shaft would cost

approximately $447,400. Based on these figures, we estimate the total cost of the proposed AD to U.S. operators to be $1,351,755.

Regulatory Findings

We have determined that this proposed AD would not have federalism implications under Executive Order 13132. This proposed AD would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that the proposed regulation:

1. Is not a "significant regulatory action" under Executive Order 12866;

2. Is not a "significant rule" under the DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and

3. Would not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

We prepared a summary of the costs to comply with this proposal and placed it in the AD Docket. You may get a copy of this summary by sending a request to us at the address listed under ADDRESSES. Include "AD Docket No. 2003-NE-18-AD" in your request.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

The Proposed Amendment

Under the authority delegated to me by the Administrator, the Federal Aviation Administration proposes to amend 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

General Electric Company: Docket No. FAA-2004-19144; Directorate Identifier 2003-NE-18-AD.

Comments Due Date

(a) The Federal Aviation Administration (FAA) must receive comments on this airworthiness directive (AD) action by [insert date 60 days after date of publication in the FEDERAL REGISTER].

Affected ADs

(b) None.

Applicability

(c) This AD applies to certain GE CF6-80C2 and CF6-80E1 turbofan engines that have a high pressure compressor rotor (HPCR) stage 11-14 spool shaft with a part number (P/N) listed in Table 1 of this AD and that had a seal wire groove repaired using a circumferential cut at a location specified in Table 2 of this AD. These engines are installed on, but not limited to, Airbus Industrie A300, A310, and A330 series airplanes and Boeing 747, 767, and MD-11 series airplanes.

Table 1. Stage 11-14 Spool Shaft P/Ns By Engine Model and Forging Group Designations

Engine Model	Stage 11-14 Spool Shaft P/Ns	Forging Group Designations
CF6-80C2	9380M30G07, 9380M30G08, 9380M30G09, 9380M30G10, 9380M30G12, 1509M71G02, 1509M71G03, 1509M71G04, and 1509M71G05	Group 1
CF6-80C2	1531M21G01, 1531M21G02, 1531M21G04, 1509M71G06, 1509M71G07, 1509M71G08, 1509M71G11, 1509M71G12, 1703M74G01, and 1703M74G03	Group 2
CF6-80E1	1509M71G11, 1509M71G12, 1509M71G13, 1644M99G03, 1703M74G01, and 1703M74G03	Not Applicable

Unsafe Condition

(d) This AD results from an updated stress analysis. We are issuing this AD to prevent failure of the HPCR stage 11-14 spool shaft due to low-cycle fatigue that could result in an uncontained engine failure.

Compliance

(e) You are responsible for having the actions required by this AD performed within the compliance times specified unless the actions have already been done.

CF6-80C2 Engines

(f) For CF6-80C2 series engines with HPCR stage 11-14 spool shaft serial numbers listed in 1.A.(2) of GE Aircraft Engines (GEAE) Service Bulletin (SB) No. CF6-80C2 S/B 72-1052, Revision 1, dated February 5, 2004, inspect the spool shaft for the location of the circumferential cut repair at the next piece-part exposure.

(1) If the stage and location of the repair is specified in the engine records, inspect prior to exceeding the cycles-since-repair (CSR) limit specified in the column titled, **Replace By (CSR)**, in Table 2.

(2) If the stage or location of the repair is not known from the engine records, remove the spool shaft for inspection before exceeding 4,200 CSR for the Group 1 or before exceeding 10,000 CSR for Group 2. Use 3.A.(1) of the Accomplishment Instructions of GEAE SB No. CF6-80C2 S/B 72-1052, Revision 1, dated February 5, 2004, for the inspection. Table 2 follows:

Table 2. Repair and Replacement Limits for Spool Shafts by Forging Group and Location of the Circumferential Cut Repair

Engine Model	Forging Group (From Table 1)	Stage	Location of Circumferential Cut Repair	Repair by (CSR) Limit	Replace By (CSR) Limit
(1) CF6-80C2	Group 1	14	(i) Aft Seal Wire Groove – Not in Area X.	3,600	4,200
			(ii) Aft Seal Wire Groove – In Area X.	None – Replace spool	4,200
			(iii) Forward Seal Wire Groove – Not in Area X.	7,100	7,100
			(iv) Forward Seal Wire Groove – In Area X.	None – Replace spool	7,100
(2) CF6-80C2	Group 1	13	(i) Aft Seal Wire Groove – Not in Area X.	7,100	7,100

			(ii) Aft Seal Wire Groove – In Area X.	2,740	7,100
			(iii) Forward Seal Wire Groove – Not in Area X.	7,100	7,100
			(iv) Forward Seal Wire Groove – In Area X.	7,100	7,100
(3) CF6-80C2	Group 1	12	Aft Seal Wire Groove – In Area X.	7,100	7,100
(4) CF6-80C2	Group 2	14	(i) Aft Seal Wire Groove – Not in Area X.	13,700	13,700
			(ii) Aft Seal Wire Groove – In Area X.	None – Replace spool	13,700
			(iii) Forward Seal Wire Groove – In Area X.	9,830	10,000
(5) CF6-80C2	Group 2	13	(i) Aft Seal Wire Groove – In Area X.	9,830	10,000
			(ii) Forward Seal Wire Groove – In Area X.	9,830	10,000
(6) CF6-80C2	Group 2	12	Aft Seal Wire Groove – In Area X.	9,830	10,000
(7) CF6-80E1	Not Applicable	14	(i) Aft Seal Wire Groove – Not in Area X.	11,600	11,600
			(ii) Aft Seal Wire Groove – In Area X.	None – Replace spool	11,600

			(iii) Forward Seal Wire Groove – In Area X.	8,080	11,600
(8) CF6-80E1	Not Applicable	13	(i) Aft Seal Wire Groove – In Area X.	8,080	11,600
			(ii) Forward Seal Wire Groove – In Area X.	8,080	11,600
(9) CF6-80E1	Not Applicable	12	Aft Seal Wire Groove – In Area X.	8,080	11,600

(g) If you have a Group 2 spool shaft, and the circumferential cut repair is in the Stage 14 forward location, and not in Area X, no further action is required by this AD. However, GEAE recommends that you repair these spools at the next exposure of the spool shaft.

Replacement of the Spool Shaft

(h) If the spool shaft exceeds the CSR limit in the column titled, **Replace by (CSR)**, in Table 2 of this AD, replace the spool shaft within 420 cycles-in-service (CIS) after the effective date of this AD or within the published part life limit, whichever occurs first.

Repair of the Spool Shaft

(i) You may repair the spool if the CSR on the spool shaft are fewer than or equal to the limit in the column titled, **Repair by (CSR)**, in Table 2 of this AD. Use 3.B. of the Accomplishment Instructions of GEAE SB CF6-80C2 S/B 72-1052, Revision 01, dated February 5, 2004, for the repair.

CF6-80E1 Engines

(j) For CF6-80E1 series engines with HPCR stage 11-14 spool shafts with SNs listed in 1.A.(2) of GEAE SB No. CF6-80E1 S/B 72-0232, Revision 01, dated February 5, 2004, do the following:

(1) Inspect the spool shaft for the location of the cut circumferential repair at the next piece-part exposure, but before exceeding 11,600 CSR. Use 3.A.(1) of the Accomplishment Instructions of GEAE SB No. CF6-80E1 S/B 72-0232, Revision 01, dated February 5, 2004 for the inspection.

(2) If the circumferential cut repair is in the Stage 14 forward location, and not in Area X, no further action is required by this AD. However, GEAE recommends that you repair these spools at the next exposure of the spool shaft.

Replacement of the Spool Shaft

(k) If the CSR are higher than 11,600 CSR, replace the spool shaft within 420 CIS after the effective date of this AD or within the published part life limit, whichever occurs first.

Repair of the Spool Shaft

(l) You may repair the spool if the CSR on the spool shaft are fewer than or equal to the limit in the column titled, **Repair by (CSR)**, in Table 2 of this AD. Use 3.B. of the Accomplishment Instructions of GEAE SB CF6-80E1 S/B 72-0232, Revision 01, dated February 5, 2004, for the repair.

Alternative Methods of Compliance (AMOCs)

(m) The Manager, Engine Certification Office, has the authority to approve alternative methods of compliance for this AD if requested using the procedures found in 14 CFR 39.19.

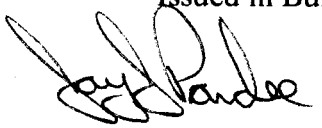
Material Incorporated by Reference

(n) None.

Related Information

(o) None.

Issued in Burlington, Massachusetts, on September 15, 2004.



Jay J. Pardee,
Manager, Engine and Propeller Directorate,
Aircraft Certification Service.